

## **R. Whittier Comments - Meeting Summary – AOC SOW Section 6 and 7, dated: 28 April 28, 2016**

NOTE: All but the last comment on this document may be best left for the SOW/WP Section 3&4 review.

### **Section 2. Navy Responses to the February 4, 2016 Scoping Completion Letter, Page: 1**

#### **Second Paragraph**

- The contention that OWDFMW1 is down gradient of the Red Hill Shaft is not supported by evidence. A review of the EarthTech (2000) report of the Oily Waste Disposal Facility Figure 3-7 shows that groundwater in the OWDB flows in the general direction of the Red Hill Shaft. The report further shows that the groundwater in the OWDB is confined strongly suggesting that the petroleum range organic contamination at OWDFMW1 is from a location other than the OWDB. Thus the USTs need to be considered as possible source of the TPH at OWDFMW1.

### **Section 2. Navy Responses to the February 4, 2016 Scoping Completion Letter, Page: 2**

#### **First Paragraph**

- The No Further Action letter relates to contamination at the OWDB. As described above, the contamination detected in OWDFMW1 likely did not come from the OWDB. Also, OWDFMW1 is part of the agreed up monitoring network to evaluate contamination from the USTs so all chemistry at OWDFMW1, including the extremely high pH, is relevant to the current investigation.

### **Section 3. April 7, 2016 DOH Letter, Page 2**

- The statement “DOH requested verification of the anomalous results and high pH detected at OWDFMW01” is not correct. What was requested was an evaluation of the causes of the high pH and how the conditions responsible for the high pH might provide more insight to groundwater flow patterns at the Facility.

Note the statement associated with the above bullet should be corrected in tele-conference summary.

**Comments – Meeting Summary – Red Hill Bulk Fuel Storage Facility  
Administrative Order on Consent (AOC) Statement of Work (SOW) Red Hill  
Subject Matter Expert Meeting, May 10, 2016**

**Page 1, Paragraph 1)**

The listing for the Dept. of Health should be “State of Hawaii Department of Health Solid and Hazardous Waste Branch, and Safe Drinking Water Branch (DOH)”. It should also point out that the University of Hawaii was present in an advisory role to the DOH.

**General Comment:**

Missing from this summary are statements made during the meeting on May 10 that support a regional groundwater flow direction from the Moanalua to the Waimalu Aquifer. These include:

- D. Oki (USGS) summary of the USGS pump test and response detected on the east side of the Halawa Valley Fills;
- Chemistry of RHMW04 cited by E. Lau, HBWS as evidence of northwest groundwater flow;
- D. Oki’s (USGS) comment that bottom boundary of the model is not static and will change with the proposed increased pumping rate scenarios;
- D. Oki’s comment that it is best to move the lateral boundaries of the model to boundaries with known hydraulic characteristics; and
- D. Oki’s comment that a plumbness survey of the wells is needed.

## **Suggestions and Comments on the: Approval in part of Red Hill AOC SOW Deliverable under Sections 6 & 7 – Monitoring Well Installation Work Plan**

### **General Comments:**

During the Navy/AECOM/DOH/EPA conference call on June 6, 2016 three issues were raised by AECOM and the Navy that need further consideration:

1. The proposed location of RHMW11 has been moved about 600 ft south of the original location placing it nearly adjacent to the South Halawa Stream;
2. In response to Regulator's contention that cement grout rather than bentonite chips be used to seal the annulus of the well bore in the vadose zone, the Navy and AECOM proposed using a bentonite slurry; and
3. As pointed out by the Navy during the conference call, it is time consuming to do a gyroscopic plumbness alignment survey during drilling.

Prior to approving the change in the RHMW11 location, further discussion is warranted as to the advantages and disadvantages of this move. The stated rationale is that the new location will give better information about the geometry of the South Halawa Valley Fill. However, there should be more factors considered. Examples include the importance of characterizing the South Halawa Valley Fill. The Rotzoll and El-Kadi model that AECOM and the Navy use as the starting point for their conceptual model of groundwater flow indicates that the North Halawa Valley Fill has a much greater effect on groundwater flow than the South Halawa Valley Fill. So the benefit of better characterizing the South Halawa Valley Fill is in question. Another consideration is the optimum well geometry to evaluate the groundwater gradient. The original location was much better suited for evaluating the groundwater gradient from the Moanalua Aquifer to the Waimalu Aquifer. The inter-aquifer flow is a key component of the risk assessment since. If significant inter-aquifer flow does occur, contamination from the facility could be transported to the vicinity of the Halawa Shaft.

In the Approval Letter, DOH and EPA requested that annulus between the solid well casing and the borehole be sealed with cement grout rather than bentonite chips. The rationale being that bridging (void spaces) results unless the bentonite chips carefully emplaced, adequately hydrated between lifts, and sufficient wait time is allowed between lifts for the water chips to react. The Navy and AECOM proposed using a bentonite slurry. A review of the National Ground Water Association Manual of Water Well Construction – 2<sup>nd</sup> edition (1998) states that cement grout can suffer from some of the same deficiencies as improper use of bentonite chips. A bentonite grout is recommended for sealing the annulus of the well in the unsaturated zone. A bentonite grout could include a bentonite slurry, but the Navy needs to provide more detail on grout composition and how it will be installed since the composition and method of installation are important.

This issue of well plumbness is a water level measurement issue. Deviations of a well casing deviates from true vertical will affect the accuracy of water level measurements. It is the wire line measured distance from the top of casing to the groundwater that water table elevations are calculated from. It is not critical that well casing be exactly plumb, but rather any deviation from

true vertical be known so corrections to the wire line measurements can be made. A true vertical depth survey can be done after the well is installed preventing the need to stop drilling and run a gyroscopic instrument down the bore hole. Suggested wording:

The Regulatory Agencies request that a quantitative true vertical depth analysis be done using a gyroscopic alignment instrument either during well construction or after the wells are installed so appropriate corrections can be made to wireline measured depth to water.

See the track change changes in the reviewed letter for suggested edits.

